

REMARKS

The Office Action dated July 28, 2004, has been received and carefully noted. The amendments made herein and the following remarks are submitted as a full and complete response thereto.

As a preliminary matter, Applicants appreciate the indication of allowable subject matter in claims 4 and 13 of the present application.

Claims 1-18 are pending in the present application and are respectfully submitted for consideration.

In the outstanding Office Action, Claims 1-3, 5-12 and 14-18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Thompson et al. (U.S. Patent No. 6,252,454, "Thompson") in view of Fischer et al. (U.S. Patent No. 5,894,283, "Fischer"). Applicants respectfully traverse this rejection for at least the reasons set forth below.

Independent Claims 1 and 10 recite an AD converter having a feature wherein a control circuit controls operating timing of the amplifiers so as to make at least one of the amplifiers begin operating in a middle of the first period, or so as to make a current flow in at least one of the amplifiers only during a latter portion of the first period. Therefore, it is possible to reduce the average current consumed by a comparator during a sampling period. Applicants respectfully submit that neither Thompson nor Fischer discloses or suggests such a feature.

In making this rejection, the Office Action asserts that Thompson teaches in figure (2B) a multistage comparator circuit usable in an analog-to-digital converter, the circuit comprising: a plurality of inverting differential amplifiers

(201, 202, 203) connected in series which amplify a sampled input signal, the amplifiers receiving a steady-state current from a programmable source (131, 132, 133); a control circuit (14) connected to each amplifier for directing their respective start and stop times at any point in a period.

Applicants submit that Thompson's programmable sources (PS) 131 through 133, shown in Fig. 2A, are calibration circuits, and serve to adjust the offsets of the amplifiers 201 through 203, and similarly, 101 through 103. To be specific, the electric current (or voltage) of the programmable source 131 is programmed according to the flowchart shown in Fig. 5 through Fig. 7C of Thompson. Programming the electric current (or voltage) of the programmable sources 131 through 133 cancels the offset of the amplifiers 201 through 203. Once programmed, the programmed values of the programmable sources 131 through 133 are fixed, and an AD conversion process is performed. Thompson does not explicitly disclose the AD conversion. As shown in Fig. 2D, registers 135 and 136 are included in the programmable sources to provide a place to store programmed values. These programmed values are supplied to the amplifier 101.

In this manner, Thompson is directed to the calibration of offsets of amplifiers. The control logic circuit 14 of Thompson is used for calibration. Such calibration is performed prior to an AD conversion process, and Thompson is silent about how such an AD conversion process is carried out. Thompson neither discloses nor suggests a sample-and-hold operation. Thus, Thompson neither discloses nor suggests the claimed feature regarding the control of

operating timing of amplifiers in a sample or a sample and hold period (i.e., the first period), as recited in Claims 1 and 10.

The Office Action admits that Thompson fails to disclose a sample and hold circuit. Fischer is cited for providing a sample and hold circuit. However, similar to Thompson, Fischer does not disclose or suggest the claimed feature regarding the control of operating timing of amplifiers in a sample and hold period, or current flowing in at least one amplifier only during a latter portion of a first sampling period. Thus, Applicants respectfully submit that the combination of Thompson and Fischer cannot and does not disclose or render obvious the above-mentioned features of the claimed invention.

To establish *prima facie* obviousness of a rejected claim, the applied art of record must teach or suggest each feature of a rejected claim. See M.P.E.P. §2143.03. As explained above, none of the applied art of record, either alone or in combination, teaches or suggests each and every feature recited by independent Claims 1 and 10 of the instant application. Accordingly, Applicants respectfully submit that independent Claims 1 and 10 are not rendered obvious in view of the applied art of record and should be deemed allowable.

Claims 2-9 and 11-18 depend from Claims 1 and 10, respectively. It is respectfully submitted that these sixteen (16) dependent claims should also be deemed allowable for at least the same reasons as Claims 1 and 10, as well as for the additional subject matter recited therein.

Applicants respectfully request withdrawal of the rejections.


Conclusion

In view of the above, Applicants respectfully submit that each of claims 1-18 recite subject matter that is neither disclosed nor suggested in the cited prior art. Applicants also submit that the subject matter is more than sufficient to render the claims non-obvious to a person of ordinary skill in the art, and therefore respectfully request that claims 1-18 be found allowable and that this application be passed to issue.

If for any reason, the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact the Applicants' undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper has not been timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300 referencing Attorney Docket No. 100353-00183.

Respectfully submitted,


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